Knowledge and attitudes of syphilis and syphilis pre-exposure prophylaxis (PrEP) among men who have sex with men in Vancouver, Canada: a qualitative study

Ronita Nath,1,2,3 Troy Grennan,1,3 Robin Parry,1 Fahmy Baharuddin,1 James P Connell,1 Jason Wong,1,4 Daniel Grace5

ABSTRACT

Objectives In British Columbia, Canada, syphilis is at record-high rates, with over 80% of cases in 2017 seen in gay, bisexual and other men who have sex with men (GBM). The syphilis epidemic is of particular concern for those living with HIV, since syphilis may lead to more serious complications in this population. We sought to explore syphilis-related knowledge and attitudes around biomedical prevention options for syphilis, with the goal of informing effective strategies to prevent syphilis.

Design We conducted a qualitative study consisting of indepth, individual interviews from December 2016 to June 2017. Our interviews focused on participants’ knowledge about syphilis and perceptions regarding syphilis pre-exposure prophylaxis (PrEP). Interviews were analysed using Grounded Theory.

Participants Twenty-five GBM were interviewed (64% white; median age: 43 years), including men living with HIV and/or a history of syphilis.

Setting Vancouver, British Columbia.

Results Five interrelated themes emerged. First, GBM were aware of the local syphilis epidemic. Second, syphilis-related knowledge differed according to syphilis and HIV serostatus. Third, competing ideas emerged regarding men’s concerns about syphilis. While our participants expressed concern about getting syphilis, they also described the importance of sexual pleasure. Fourth, many participants said that syphilis was not perceived to be alarming; preventing HIV infection remained a primary concern for many. Finally, while syphilis PrEP was appealing to those living with HIV or a prior syphilis diagnosis, others were concerned about antibiotic resistance, cost and side effects.

Conclusions Our participants organised their safer sex strategies around HIV, not syphilis. Although syphilis-related knowledge was relatively high among GBM living with HIV and those with a prior syphilis diagnosis, this knowledge did not appear to be related with safer sexual practices, such as increased condom use. This work highlights the importance of examining other potential prevention solutions, such as syphilis PrEP.

INTRODUCTION

Recent advances in biomedical prevention like HIV pre-exposure prophylaxis (PrEP) and treatment as prevention (TasP) have had dramatic impacts on HIV incidence.1 2 At the same time, there has been a resurging epidemic of bacterial sexually transmitted infections (STIs) and STI-related sequelae.3 4 In British Columbia (BC), Canada’s western-most province, syphilis is at unprecedented levels, with a rate of 10.8 per 100000 in 2017.5 Risk factors for syphilis include lack of condom use, unprotected oral sex and recreational drug use.6 7 Gay, bisexual and other men who have sex with men (GBM) continue to be disproportionally affected by the current infectious syphilis epidemic in BC, constituting 82.9% of all cases in 2017.8 The number of infectious syphilis cases (primary, secondary and early latent syphilis)
among GBM has been steadily increasing since 2011. Among GBM syphilis cases where HIV status was known, 40% were living with HIV.1 Forty-six per cent of HIV cases in BC are among GBM.9 The emergence of syphilis has particular implications for GBM living with HIV, who are often at risk for more serious complications from bacterial STIs, including more severe cutaneous lesions in early syphilis,10 higher likelihood of ocular syphilis11 and infection of the lymphatic system known as lymphogranuloma venereum caused by the bacteria Chlamydia trachomatis.12

Interventions to address the syphilis epidemic have mainly focused on extending testing and treatment, enhancing partner notification and encouraging GBM to modify their sexual behaviours, such as using condoms.3 13 Despite these efforts, syphilis incidence continues to rise and novel approaches for responding to the syphilis epidemic are needed. Addressing the rates of syphilis among GBM requires a nuanced understanding of the knowledge and attitudes GBM have towards syphilis and syphilis prevention strategies. Although there has been a growing research base that qualitatively investigates the HIV knowledge, sexual practices and multifactorial impacts of biomedical advancements in HIV prevention among GBM living with HIV,14–16 there has been a dearth of qualitative work specifically examining syphilis and views towards syphilis prevention for GBM.

To date, limited qualitative studies have investigated syphilis knowledge and attitudes among GBM17 18; Stahlman et al examined acceptable syphilis interventions among GBM with repeat syphilis infections.19 According to this research, there is a strong stigma associated with syphilis among many GBM.17 18 GBM perceive syphilis to be a ‘dirty’ disease17 18 which hinders syphilis disclosure and partner notification,18 despite considerable knowledge about syphilis symptoms, transmission and consequences.17 Syphilis prevention strategies preferred by GBM include increased accessibility and testing strategies for syphilis, as well as prophylactic treatment, although participants expressed concerns about potential side effects with such treatment.19 This body of literature included only men who had been previously diagnosed with syphilis.

There is a critical need to better understand how syphilis is perceived among diverse GBM in Canada. BC is a particularly important context to study the syphilis epidemic due to the shifting knowledge around seroadaptive behaviours,15 16 its historical focus on early HIV detection and TasP20 and the recent public funding of HIV PrEP.21 22 The high uptake of HIV PrEP, recent pilot studies demonstrating promise of using daily doxycycline for syphilis chemoprophylaxis (henceforth, syphilis PrEP)23 24 and the qualitative study in California that found that GBM are interested in syphilis PrEP as a syphilis prevention strategy,19 invite further exploration.

Our overarching objective was to inductively explore syphilis-related knowledge and attitudes around biomedical prevention options for syphilis, with the goal of informing effective strategies to prevent syphilis.

METHODS

Recruitment

We conducted one-on-one interviews with 25 GBM in the Greater Vancouver area between December 2016 and June 2017 as the initial phase of a sequential, mixed-methods study. A purposive sampling strategy25 was used to recruit participants from clinic sites of the BC Centre for Disease Control and through the online sexual networking applications Scruff and Squirt. Posters in the clinics and advertisements on the online applications outlining the eligibility criteria were used to invite participants into the study. Individuals were eligible to participate if they identified as male, were 18 years of age or older, had sex with other men in the last 6 months, were fluent in English and were available to interview in-person.

Data collection and analysis

Data were collected in individual, semi-structured interviews that lasted between 45 min and 1 hour. Three trained interviewers conducted all the interviews. Interviews were audio-recorded and transcribed verbatim. The interview guide (online supplementary file) was developed in consultation with our Community Advisory Board. The guide sought to explore questions related to the social determinants of health, and covered the following domains: STI-related knowledge, beliefs and attitudes; perceptions of STI risk; the acceptability of PrEP for syphilis; experiences with healthcare providers; measures taken to prevent STIs; the role of substance use in sexual activity and decision-making; and the role of social networks. In this paper, we used a Grounded theory26 approach to help us explicate what we learnt from our participants about their syphilis knowledge and attitudes, and their acceptability of syphilis PrEP. Our use of Grounded theory helped to ensure that our conceptualisation of these sexual health topics was formed from the participants’ interpretations and meanings.27

Data were systematically analysed using QSR NVivo 10 according to the principles of Grounded theory. Grounded theory is an inductive methodology where codes are constructed from the data and grouped into categories. Categories are then integrated into a theoretical framework with coding occurring at three levels: open, axial and selective coding.28 In open coding, we reviewed the transcripts several times and labelled key concepts. In axial coding, we identified the relationships among the codes and combined categories with subcategories. The selective-coding stage involved relating other categories to the core category and refining the theoretical explanation.

To ensure methodological rigour, the authors reviewed five transcripts independently and subsequently as a coding team to familiarise themselves with the data set, note initial trends and ideas and create a provisional codebook. These codes were developed from key themes that emerged during the review of transcripts. Codes were applied to the entire data set and refined as needed. Memos were recorded throughout the iterative process.
of coding to capture analytical insights about emerging themes and relationships across the narratives.

Participants received an honorarium of USCAD$30.

**Patient and public involvement**
A Community Advisory Board guided the research activities, including providing feedback on the development of the interview guide, the interviews, analysis and dissemination of the findings.

**RESULTS**
Characteristics of the 25 GBM we interviewed are provided in Table 1. Most participants described being single and no participants had previously taken PrEP for HIV prevention. The majority of the participants described having active sexual lives. Some of the single participants reported having ‘sex buddies’, or partners they would have oral and/or anal sex with on a regular basis. The vast majority of the participants described using sexual networking applications to meet partners. Half of the participants also described visiting bathhouses recently. Most participants reported having condomless anal sex in the past 6 months.

**Themes**
Five overarching themes were identified in the analysis: (1) awareness of the local syphilis epidemiology, (2) syphilis-related health literacy, (3) competing ideas about concern for syphilis and the need to engage in pleasurable sex, (4) HIV infection as the most worrying health issue and (5) concerns, stigma and perceived benefits of syphilis PrEP. These interrelated domains are explored below.

**Awareness of the local syphilis epidemiology**
Most participants were aware of the recent surge in syphilis rates in the province, and they knew the epidemic was disproportionately impacting GBM. Some men talked about the apparent ubiquity or inevitability of syphilis if one was a sexually active gay man. A 31-year-old participant living with HIV who had been diagnosed with syphilis previously expressed this sentiment: ‘Once you’re gay, it’s just like everyone has syphilis…’. In recent years, participants noted that they had seen in the media and in their doctors’ offices that syphilis was ‘hitting at all-time highs’. However, several participants said that it was not a topic discussed among their gay friends and sexual partners. One 57-year-old HIV-negative participant who had never been diagnosed with syphilis expressed that he did not ‘get the sense that anyone’s overly concerned’. He added, ‘People don’t really ask specifics about a specific STD online… No one seems to bring it up as a concern’. Many participants shared that they were not very worried about the epidemic because they had come to understand that syphilis could be treated with antibiotics. Another participant told us he found it hard to worry about the syphilis epidemic because he did not know how to prevent it. He

<table>
<thead>
<tr>
<th>Table 1 Characteristics of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>18–29 years</td>
</tr>
<tr>
<td>30–40 years</td>
</tr>
<tr>
<td>41–51 years</td>
</tr>
<tr>
<td>52+</td>
</tr>
<tr>
<td><strong>Sex at birth</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Transgender</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>South Asian</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
</tr>
<tr>
<td>Mixed</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Aboriginal</td>
</tr>
<tr>
<td><strong>Sexual orientation</strong></td>
</tr>
<tr>
<td>Gay</td>
</tr>
<tr>
<td>Straight</td>
</tr>
<tr>
<td>Queer</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Bisexual</td>
</tr>
<tr>
<td><strong>Highest level of education</strong></td>
</tr>
<tr>
<td>Did not complete high school</td>
</tr>
<tr>
<td>High school</td>
</tr>
<tr>
<td>College</td>
</tr>
<tr>
<td>Graduate</td>
</tr>
<tr>
<td><strong>Annual income</strong></td>
</tr>
<tr>
<td>&lt;$20000</td>
</tr>
<tr>
<td>$20000–$39 000</td>
</tr>
<tr>
<td>$40 000–$59 000</td>
</tr>
<tr>
<td>$60 000–$79 000</td>
</tr>
<tr>
<td>$80 000–$99 000</td>
</tr>
<tr>
<td>Prefer not to answer</td>
</tr>
<tr>
<td><strong>Prior syphilis diagnosis</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>HIV status</strong></td>
</tr>
<tr>
<td>Negative</td>
</tr>
</tbody>
</table>

Continued
went on to say that ‘It's not like HIV where you can use a condom’.

The majority of participants explained that the rising rates in syphilis had not impacted their sexual behaviour or the way they met with prospective partners. However, a few participants did share that the epidemic had impacted their sex life. For example, a 44-year-old HIV-negative participant who had never been diagnosed with syphilis and previously frequented bathhouses, said that he stopped going several years ago when he found out he was in the hospital for a month, and I didn’t realise that I had third stage syphilis… So, with syphilis it’s passed like HIV or Hep C, it’s sexual. It’s passed through sex’.

Several participants with prior syphilis diagnoses made strong assertions of their high level of knowledge regarding syphilis, but some lacked accuracy on particular points. For instance, a few participants falsely believed that syphilis was a virus and was becoming resistant to antibiotics.

Many participants described syphilis as an ‘old’ infection, referring to an infection that has been around for a very long time. Among these participants, several understood that syphilis was a resurfing problem as well, particularly in the gay community, as described in the accounts above. For example, a 30-year-old living with HIV and with a prior syphilis diagnosis explained, ‘It (syphilis) is very old (laughs)… (T)here’s been a huge increase especially in the gay community in people contracting syphilis. If it goes untreated, it can make you really sick’.

Most HIV-negative participants with no history of syphilis disclosed having very limited syphilis-related knowledge. For these participants, the differences between syphilis, chlamydia and gonorrhoea were blurry. For example, a 25-year-old HIV-negative participant who had never had syphilis told us that he did not know much about the infection, and that his ‘knowledge about syphilis, chlamydia and gonorrhoea were all the same; they burn when you pee (laughs), and you pretty much take the same meds to get rid of them’.

Competing ideas
Syphilis-related concerns emerged as a complex theme in men’s accounts. Although all of our participants expressed that they did not want to become infected with syphilis, heterogeneity existed around the level of concern for syphilis. One recurring theme in men’s interviews was the view that syphilis was a minor health problem that could be treated easily, leading few participants to have heightened concern about the infection. For example, a 25-year-old HIV-negative participant who had never been diagnosed with syphilis exclaimed, ‘(I am) not concerned. I don’t care. It’s like a cold. You take a couple of pills and it’s gone’. Similarly, a 44-year-old HIV-negative participant who had been diagnosed with syphilis previously said, ‘I just think you can get a shot and then you’re fine, with syphilis or any other… There’s no cure for HIV, so no one really talks about the stuff you can get cured from, because what’s the point?’

Among those who were concerned about getting syphilis, participants shared that it was difficult to change their sexual behaviour to prevent infection because sexual pleasure was also very important to them. For many, the need to engage in pleasurable sex outweighed concerns they had about syphilis during a sexual encounter. For instance, when asked whether his concern for syphilis impacted his decision to use condoms, or to be more
selective in choosing his sexual partners, a 57-year-old HIV-negative participant without a prior syphilis diagnosis explained: ‘I’d say it probably doesn’t affect that. Like I said, I have some concern about it, but if I’m looking to have sex with somebody it’s not something that I’m thinking or worrying about at that time’.

The two men in the study who were living with HIV and had never been diagnosed with syphilis said that they were unconcerned about syphilis because their HIV status was a more significant issue. One of them, aged 54, put it this way: ‘Well, what’s the worst that’s going to happen to me? Nothing really, so what’s the big deal? I’m already really sick’.

Most participants with prior syphilis diagnoses were more concerned about a syphilis infection because of their traumatic experiences with the STI. Several such participants described feeling very sick when they had syphilis previously, and many reported that the treatment was extremely painful. They emphasised that they wanted to avoid a subsequent syphilis infection. Despite their negative experiences with syphilis, and their desire to avoid subsequent infections, these participants reported that they did not feel inclined to make long-term behavioural changes, such as using condoms for all sexual encounters, to prevent further infections.

‘It’s HIV versus not HIV’

HIV surfaced as the health issue of primary concern to participants irrespective of HIV status or history of syphilis diagnosis. Men highlighted that HIV was of primary concern to them, and that the other STIs were relatively minor health problems compared with HIV. Some participants expressed that HIV would be the only STI they would take precautions against because unlike syphilis, HIV is a lifelong chronic health condition. For example, a 25-year-old HIV-negative participant who had never been diagnosed with syphilis said: ‘HIV would be the only one that I would not want to get, for obvious reasons, but it wouldn’t necessarily change my decision to have sex with someone. I would just use a condom’.

As discussed above, because syphilis and many of the other STIs can be cured, they were not considered to be very important health concerns. When asked how he felt about syphilis compared with other STIs, a 26-year-old HIV-negative participant without a prior syphilis diagnosis put it quite simply: ‘It’s HIV versus not HIV’. Some participants who had been diagnosed with syphilis expressed their frustration with these views. A 44-year-old HIV-negative participant exclaimed, ‘People that haven’t had syphilis don’t realise how bad syphilis is, and it’s not a wide talked about thing, right? It’s always HIV status and that’s pretty much where it ends’.

**Syphilis PrEP: concerns, stigma and perceived benefits**

While men living with HIV or with a prior diagnosis of syphilis were very interested in syphilis PrEP, many HIV-negative participants who did not have a history of syphilis expressed several concerns about taking a daily antibiotic for syphilis prevention.

One of the major stated concerns was antibiotic resistance. A 23-year-old HIV-negative participant who had never been diagnosed with syphilis expressed his confusion with why someone would take a daily antibiotic to prevent syphilis: ‘There are super bugs. There is antibiotic resistance. Why would you do that? I mean… antibiotics also takes out the bacteria in your system like your digestive bacteria and that’s not healthy’. HIV-negative participants who did not have a prior syphilis diagnosis were also concerned about the unknown side effects to taking a daily antibiotic.

Both HIV-negative participants and participants living with HIV cited the cost of syphilis PrEP as being a potential barrier in accessing the prophylaxis. Participants believed that since the cost of HIV PrEP was exorbitant (at the time of data collection, the cost of HIV PrEP was not publicly funded), the cost of syphilis PrEP would be as well.

The idea of sex-related stigma emerged when discussing syphilis PrEP. Some participants thought that syphilis PrEP was only meant for those who were ‘very promiscuous’ and believed that they did not fall in that category: syphilis PrEP might be appropriate for ‘other’ GBM. For example, a 30-year-old HIV-negative participant who had never been diagnosed with syphilis exclaimed that he was not ‘sexually active enough’ for the drug and that it was only meant for ‘deviant(s)’.

On the other hand, many of the participants living with HIV or with a prior diagnosis of syphilis were interested in syphilis PrEP. They explained that syphilis PrEP would afford them the convenience of not having to worry about syphilis. This was the sentiment of a 31-year-old man living with HIV who had several traumatic encounters with syphilis, one of which caused him to hallucinate. He was keen on the idea of taking a daily antibiotic to prevent future syphilis infections:

A daily antibiotic? Sign me up! I mean, anything to have one less thing that I have to worry about would be great. It sucks that I’ve had syphilis three times. The second time was the most dangerous time because there was the third stage, so it was in my spinal fluid… I was almost going crazy. Well, actually I was going crazy, because I was seeing things, hearing things.

**DISCUSSION**

Our study offers significant insights into the syphilis-related health literacy of GBM, how they organise their safer sexual strategies and their willingness to take a chemoprophylactic drug to prevent syphilis. Men living with HIV or with a prior diagnosis of syphilis possessed a high level of perceived knowledge on syphilis compared with their HIV-negative counterparts and those without a prior syphilis diagnosis, possibly as a result of having...
more exposure to the healthcare system. Although men living with HIV or with a prior diagnosis of syphilis were health literate, there did not appear to be an association between men’s health literacy and sexual behaviour. For instance, men’s accounts depicted that they organised their safer sexual strategies around HIV, not syphilis, even though many of them understood that there was a resurgence of syphilis and they could be impacted by it. This was also a finding noted by Holt et al among GBM in Sydney, Australia. Men were more worried about HIV; some used condoms when having sex with men living with HIV, or they engaged in seroadaptive behaviours such as selecting their partners based on their HIV status. Participants explained that they typically did not show the same consideration to avoid a syphilis infection. Overall, concern for syphilis was low among the participants, particularly among HIV-negative GBM who had never been diagnosed with the infection.

Despite a high level of concern for HIV, and a strong desire to avoid HIV infection, men did not seem to be aware that syphilis was associated with an increased risk of HIV acquisition. These findings have implications for programme design. For instance, since participants are mostly worried about HIV infection, syphilis messaging in syphilis prevention programme should more explicitly address the link between syphilis and HIV. This message should be presented in a thoughtful and sex-positive framing.

Men’s discussions regarding syphilis PrEP revealed that a daily antibiotic holds promise as an acceptable intervention for men living with HIV and those with a prior syphilis diagnosis. Our findings indicating greater acceptance of syphilis PrEP among men living with HIV compared with HIV-negative men are consistent with that of other findings in the literature. HIV-negative participants and those without a prior syphilis diagnosis were wary about syphilis PrEP and cited several barriers to using a daily antibiotic including unknown side effects, high costs, antibiotic resistance and sex-related stigma associated with PrEP. Many of these concerns can be addressed. First, doxycycline, the antibiotic which has shown to be potentially effective in preventing syphilis in a previous small pilot study, has been widely used for decades, often on a long-term basis for acne treatment and malaria prevention and is typically well-tolerated. Second, doxycycline is inexpensive. Third, a study is currently underway in Vancouver, BC, examining the impact of doxycycline on antibiotic resistance in HIV-negative GBM. Although many of the concerns surrounding syphilis PrEP can be alleviated, there still lies the need to examine on a larger scale whether daily doxycycline is a feasible option as a syphilis prevention tool, which we will assess in the 2019 National Sex Now survey, a community-based, gay men’s health survey. It is important to note that that none of the participants reported taking HIV PrEP at the time of the interviews, which took place between 2016 to 2017. It was not until January 2018 that HIV PrEP became publicly-funded in BC, and within 6 months had been prescribed to over 2000 people. With increasing acceptance of biomedical HIV and STI prevention, this new group of HIV PrEP-using GBM may be more receptive to syphilis PrEP.

Our study is subject to several limitations. One limitation may be the lack of diversity in the risk profile of our sample. Because recruitment was limited to online applications and clinics, and did not include gay venues like bathhouses, there was the potential of missing participants who did not come to clinics or use online applications. These participants may have a different risk profile than our sample and may therefore provide different insights into syphilis-related knowledge and attitudes. Face-to-face interviews may have led to a sampling bias by discouraging potential participants who may not have felt comfortable discussing their views on syphilis directly with the interviewer. Another limitation of this study is its inability to accurately ascertain the level of health literacy among the participants. To more robustly evaluate sexual health literacy among GBM and complement these qualitative findings, we have developed some health literacy questions which will be administered to a large sample of GBM participants in the province as part of the Sex Now survey.

Our findings reaffirm earlier qualitative research showing that GBM living with HIV or with a previous syphilis diagnosis possess a high level of perceived knowledge on syphilis, unlike their HIV-negative counterparts without prior syphilis. Furthermore, like Plant et al, we found that for most of the participants, ‘the benefits of their current sexual behaviour outweigh(ed) the risks of…syphilis infection’ and that participants were reluctant to make long-term behaviour changes, such as using condoms, to avoid syphilis infections, despite being knowledgeable and concerned about syphilis. Plant et al go on to say, ‘Participants’ general awareness of the risks of syphilis and unwillingness to change their behaviour to avoid possible future infections suggest that interventions aimed at reducing risk behaviours are unlikely to succeed with these men’. Because of these circumstances, a biomedical intervention such as syphilis PrEP may be an appropriate prevention strategy for the syphilis epidemic. Our findings suggest that syphilis PrEP would be most acceptable to those living with HIV or with a previous syphilis diagnosis, as also reported by Wilson et al and Stahlman et al, respectively. However, despite some promising early data, syphilis PrEP is not currently a recommended intervention as some fundamental questions around acceptability, efficacy and its potential impact on antimicrobial resistance remain. The results presented herein contribute further feasibility data to the emerging literature on this novel syphilis prevention intervention, by highlighting important patient concerns around syphilis PrEP and identifying possible syphilis PrEP candidates.

Overall, there is a disjuncture between the concerns of public health actors and GBM. While health officials are becoming increasingly alarmed about the syphilis
epidemic, GBM continue to be moderately concerned about syphilis for several reasons, including a lack of self-efficacy or belief in their ability to overcome the epidemic, and their belief that syphilis may not be that serious because it can be treated. Because syphilis appears to be only moderately concerning to many GBM and balanced against the benefits of sexual pleasure, syphilis prevention is not prioritised among GBM. Syphilis PrEP may be a strategy that could empower some individuals to prevent syphilis and give them the agency to know they are doing something to prevent the infection, particularly in the context of a syphilis epidemic.

Author affiliations
1Clinical Prevention Services, British Columbia Centre for Disease Control, Vancouver, British Columbia, Canada
2CIHR Canadian HIV Trials Network, Vancouver, British Columbia, Canada
3Department of Infectious diseases, University of British Columbia Faculty of Medicine, Vancouver, British Columbia, Canada
4School of Population and Public Health, University of British Columbia, Vancouver, British Columbia, Canada
5Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada

Acknowledgements
We would like to acknowledge all the men who participated and shared their time, knowledge and experiences with us. We are also thankful to the Community Advisory Board members. We are grateful to the staff at Qmunity for allowing us to use their space for recruitment, and to the nurses at the BC Centre for Disease Control who helped us with participant recruitment. Dr Ronita Nath is supported by a CTN James Kegnep Postdoctoral Fellowship Award. Dr Daniel Grace is supported by a Canada Research Chair in Sexual and Gender Minority Health.

Contributors
DG and TG conceived the research question and design for the study, RN, RP and FB collected the data. RN analysed the data, with input from RP, FB and DG. RN drafted the manuscript. DG and TG supervised the data collection and analysis. DG, TG, JW and JC provided revision of the manuscript.

Funding
This study was supported by the Vancouver Foundation and BC Centre for Disease Control Foundation for Public Health UNR150412.

Competing interests
None declared.

Patient consent for publication
Not required.

Ethics approval
Research Ethics Board approval was obtained from the University of British Columbia Clinical Research Ethics Board (ethics approval number H16-00423). All participants gave informed written consent prior to taking part in this research.

Provenance and peer review
Not commissioned; externally peer reviewed.

Data availability statement
All data relevant to the study are included in the article or uploaded as supplementary information.

Open access
This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

ORCID iD
Ronita Nath http://orcid.org/0000-0002-3630-7915

REFERENCES
4 Cranston RD. Anal cancer prevention: how we are failing men who have sex with men. Sex Transm Infect 2013;89:7–9.


